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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/833,247 | 04/11/2001 | Michael R. Bruce | AMDA.486PA | 3719 |

7590 07/01/2004
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EXAMINER

HESELTIME, RYAN J

| ART UNIT | PAPER NUMBER |
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2623

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DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/833,247

Applicant(s)

BRUCE ET AL.

Examiner

Ryan J Hesseltine

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: there are no brief drawing descriptions for Figures 6 or 7. It also appears that the description for Figure 5 on page 4 actually describes Figure 7.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Phaneuf et al. (USPN 6,288,393, newly cited), hereafter Phaneuf, in view of Sandhu et al. (USPN 5,196,353, newly cited), hereafter Sandhu.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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5. Claims 1-6, 8, 11 and 14-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Phaneuf et al. (USPN 6,288,393, newly cited), hereafter Phaneuf.

6. Regarding claims 1, 14 and 15, Phaneuf discloses a method and system for analyzing an integrated circuit die (abstract), the system and method comprising: a substrate removal arrangement (means) adapted to remove substrate from a selected portion of the die; an image recording arrangement (means) adapted to simultaneously record a plurality of images of the selected portion while substrate is being removed therefrom (column 7, line 18-25); and an image creation arrangement (means) adapted to create a three-dimensional image of the selected portion of the die with a plurality of images recorded by the imaging arrangement (column 9, line 34-49).

7. Regarding claim 2, Phaneuf discloses that removing substrate includes cross-sectioning the die (column 10, line 62-65).

8. Regarding claims 3 and 16, Phaneuf discloses that the substrate removal arrangement includes using a FIB (focused ion beam) device (column 6, line 5-12).

9. Regarding claims 4 and 17, Phaneuf discloses that recording a plurality of images includes using a SEM (e-beam device) adapted to create a SEM image (column 6, line 45-53).

10. Regarding claims 5 and 18, Phaneuf discloses that the substrate removal arrangement and the image recording arrangement are included in a single dual FIB/e-beam device adapted to remove substrate with the FIB and to create a SEM image with the e-beam (column 6, line 45-53).

11. Regarding claims 6 and 19, Phaneuf discloses programming a controller adapted to control the dual FIB/e-beam device to effect the recording of a sufficient amount of SEM images

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(column 9, line 4-15) to create a three-dimensional image of the selected portion (column 9, line 34-49).

12. Regarding claim 8, Phaneuf discloses that creating a three-dimensional image includes combining the plurality of images of the selected portion and creating a combined (composite or mosaic) image therefrom (column 9, line 34-49).

13. Regarding claim 11, Phaneuf discloses that creating a three-dimensional image includes using selected ones of the plurality of images of the selected portion to create a three-dimensional image of less than (a portion of) the entire selected portion (column 9, line 34-49).

14. Regarding claim 20, Phaneuf discloses that the image creation arrangement includes a computer adapted to create the three-dimensional image in response to image characteristic selections (column 9, line 34-49).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 7, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Phaneuf as applied to claim 1 above, and further in view of Lee (USPN 6,403,439, newly cited).

17. Regarding claims 7, 9 and 10, Phaneuf does not disclose that removing substrate from the selected portion includes exposing a defect in the die or that creating a three-dimensional image includes creating a three-dimensional image of the defect and using the image of the detected defect to analyze the defect. Lee discloses a method of preparing for structural analysis of a deep

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trench-type capacitor wherein removing substrate from a selected portion includes exposing a defect and creating a three-dimensional image of the defect in order to analyze the defect (abstract; column 1, line 58-column 2, line 16). It would have been obvious to one of ordinary skill in the art at the time the invention was made to remove substrate to expose a defect in the die and create a three-dimensional image to analyze the defect as taught by Lee in order to facilitate inspection of the device for the detection of possible structural defects such as metal shorts, capacitor holes, and particle failures (column 2, line 7-16).

18. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Phaneuf as applied to claim 1 above.

19. Regarding claim 12, Phaneuf does not disclose editing the three-dimensional image to create an edited image of only a portion of the three-dimensional image. The examiner takes Official Notice that editing techniques are well known in the art of image processing. It would have been obvious to one of ordinary skill in the art at the time the invention was made to edit the three-dimensional image to create an edited image of only a portion of the three-dimensional image in order to display only a relevant portion of the three-dimensional image such as the portion exhibiting a defect or the like.

20. Regarding claim 13, Phaneuf discloses that editing the three-dimensional image (see above discussion of claim 12) includes creating an image of a cross-section of the selected portion (column 10, line 62-65).

Conclusion

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21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- USPN 5,093,572 to Hosono discloses a scanning electron microscope for observation of cross section including a focused ion beam.
- USPN 5,196,353 to Sandhu et al. discloses a method for controlling a semiconductor (CMP) process by simultaneously measuring a surface temperature and developing a thermal image of the wafer.
- USPN 5,561,293 to Peng et al. discloses a method of failure analysis with CAD layout navigation and FIB/SEM inspection.
- USPN 5,741,171 to Sarfaty et al. discloses a precision polishing system for use in the examination of failed semiconductor wafers including a video microscope
- USPN 5,844,416 to Campbell et al. discloses an ion-beam apparatus and method for analyzing and controlling integrated circuits including failure analysis.
- USPN 5,972,725 to Wollesen et al. discloses device analysis for face down chip wherein a portion of the semiconductor substrate is removed and a SEM probe is directed onto selected regions of the surface exposed by removal of the substrate.
- USPN 6,566,654 to Funatsu et al. discloses inspection of circuit patterns for defects and analysis of defects using a charged particle beam including thinning a portion of the chip and observing the thing portion under a transmission electron microscope.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J Hesseltine whose telephone number is 703-306-4069.

The examiner can normally be reached on Monday - Friday, 8:30 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ryan J. Hesseltine
June 26, 2004

JINGGEWU
PRIMARY EXAMINER

